

OXFORD IN ASIA COLLEGE TEXTS

THE PHYSICAL GEOGRAPHY OF THE TROPICS

An Introduction

JOHN G. LOCKWOOD



Contents

Preface

v Acknowledgements

vi

PART A INTRODUCTION

1 The Nature of Physical Geography	3	Peneplains	12
Method of Approach	3	Rocks	15
Systems	4	Igneous Rocks	
Isolated, Closed and Open Systems		Sedimentary Rocks	
Morphological, Cascading and		Metamorphic Rocks	
Process-response Systems		The Rock Cycle	
Entropy	7	Geological Time-scales	
Decaying, Cyclic and Haphazardly		Continental Drift and Plate Tectonics	16
Fluctuating Systems	8	The Evolution of the Continents	18
Decaying Systems		and Oceans	
Cyclic Systems		Present Structure of the Continents	20
Haphazardly Fluctuating Systems		and Oceans	23
The Ecosystem	9	The Structure of South-East Asia	24
Tropical Ecosystems	9	The Structure of the Malay	
Further Reading	10	Peninsula	
		Highlands	
		Old Alluvium	
		Modern Deposits	
2 The Structure of the Earth	11	Further Reading	26
Isostasy	11		

PART B ENERGY IN THE TROPICAL ENVIRONMENT

3 The Nature of Energy	29	4 Radiation in the Tropical	
Heat	29	Environment	36
Radiation	30	Short-wave Radiation	38
Potential Energy	30	Long-wave Radiation	42
Kinetic Energy	30	The Net Radiation	43
Chemical Energy	30	Energy Balance	44
Electric and Magnetic Energies	31	Bowen Ratio	47
Energy Transformations	31	Radiation within the Tropics	48
Energy in the Atmosphere	31	Further Reading	51
Bernoulli's Theorem	35		

PART C MOTION AND MOTION SYSTEMS

5	Motion in the 'Natural Environment'	55	Tropical Air Masses	71
	Friction	56	The Sub-tropical Anticyclones	71
	The Earth's Rotation	57	The Trade Winds	71
	Boundary Layers	59	The Equatorial Trough	75
	The Circulation of the Atmosphere	62	Rain-forming Disturbances	75
	Depressions and Anticyclones	66	The Monsoon Climates of Southern Asia	79
	The Wind-driven Circulation of the Oceans	68	The Climate of Equatorial South-East Asia	87
6	The Weather and Climate Systems of the Tropics	71	Further Reading	86

PART D WATER IN THE TROPICAL ENVIRONMENT

7	The Hydrological Cycle	89	Glacial Erosion and Deposition	123
	Precipitation	92	Striations	
	Evaporation and Evapotranspiration	95	Roches Moutonnées	
	Interception	97	Drumlins	
	Infiltration	99	U-shaped Valleys	
	Soil Moisture	100	Cirques	
	Groundwater	101	Moraines	
	Water-balance	102	Kames	
8	Rivers and River Systems	108	Kettles	
	Hydrographs	109	Eskers	
	Some Further River Hydraulics	113	Valves	
	Floods	114	The Present-day Distribution of Ice-sheets and Glaciers	125
	Transportation, Deposition and Erosion by Rivers	118	Pleistocene Glaciations	127
	Further Reading	119	Wurm Climates	128
9	Glaciers and Glaciation	120	Glacial Eustatic and Isostatic Controls of Sea-level	129
	The Elementary Physics of Ice and Snow	121	Further Reading	130

PART E THE CHEMISTRY AND BIOLOGY OF THE TROPICAL ENVIRONMENT

10	Matter in the Tropical Environment	133	11 Landscape Ecology and Tropical Ecosystems	147
	The Nature of Matter	133		151
	The Solvent Power of Water	134	Soils	
	Chemical Cycles	135	Soil Horizons	
	Ocean Water and River Water	135	Soils of the Humid Tropics	
	Weathering	136	World Distribution	
	Physical Weathering		Desert Soils	158
	Chemical Weathering		Vegetation and Ecosystems	
	Common Weathering Products		Tropical Rain Forest	
	Weathering and Climatic Conditions		Vegetation Succession	160
	The Carbon Dioxide-Calcium Carbonate System	138	Further Reading	161
	Erosion	140		
	Landforms of the Malay Peninsula	145	Index	161